Claims

1. A method for determining the quality of a formation fluid sample comprising:

(a) conveying a tool into a borehole on a work string, the borehole traversing a subterranean formation containing formation fluid under pressure, the borehole and work string having an annulus between the borehole wall and work string, the annulus being filled with a pressurized fluid containing the formation fluid;

(b) sealing a portion of the annulus by extending at least one selectively extendable device disposed on the tool;

(c) exposing a port to the sealed portion of the annulus, the port being in fluid communication with a test volume created by (a) and (b), the test volume containing a fluid including the formation fluid;

(d) increasing the test volume at a first rate with a volume control device until the test volume pressure falls below formation pressure; and

(e) sensing at least one characteristic of the fluid using a test device at least twice while the test volume is being increased at the first rate.

2. The method of claim **1** wherein the at least one parameter of interest is selected from a group consisting of (i) permeability, (ii) mobility, (iii) fluid compressibility, (iv) contact points, and (v) pressure.

3. The method of claim **2** further comprising:

plotting the parameter of interest versus time to determine the quality of a sample.

4. The method of claim **2** further comprising:

matching a pumping rate to the parameter of interest to ensure single sample acquisition.

5. The method of claim **2** further comprising:

detecting a pumping problem based on the parameter of interest.

6. The method of claim **2**, further comprising:

determining a correlation coefficient for pressure; and

detecting a pumping problem based on the correlation coefficient.

7. The method of claim **3**, further comprising:

monitoring a parameter of interest versus time to determining formation cleanup.

8. The method of claim **3** wherein sensing at least one characteristic of the fluid includes a characteristic selected from the group consisting of (i) pressure, (ii) temperature, (iii) volume, (iv) change in volume, (v) volume change rate, and (vi) compressibility.

9. The method of claim **3** further comprising:

monitoring a parameter of interest versus time to determine whether a formation sample is in a single phase state.

10. An apparatus for determining at least one parameter of interest of a subterranean formation, the formation having a borehole drilled therein traversing a reservoir containing formation fluid under pressure, the apparatus comprising:

(a) a tool conveyable into the borehole on a work string, the borehole and work string having an annulus between the borehole wall and work string, the annulus being filled with a fluid;

(b) at least one selectively extendable device disposed on the tool to seal a portion of the annulus;

(c) a port exposable to the sealed portion of annulus;

(d) a test volume in fluid communication with the port, the test volume containing at least some formation fluid;

(e) a volume control device for varying the volume of the test volume to at plurality of predetermined rates including non-zero rates;

(f) a test device capable of sensing at least one characteristic of the fluid at least twice while the test volume is being increased each of the plurality of rates; and

(g) a processor capable of using the at least one sensed characteristic to modify each of the plurality of predetermined rates.

11. An apparatus according to claim **10** wherein the fluid volume control device includes at least one pump.

12. An apparatus according to claim **10** wherein the at least one parameter of interest is selected from a group consisting of (i) pressure, (ii) permeability, (iii) mobility, (iv) fluid compressibility, (v) temperature and (vi) contact points.

13. An apparatus according to claim **10** wherein the at least one sensor is selected from the group consisting of (i) a pressure sensor; (ii) a volume sensor, and (iii) a temperature sensor.

14. An apparatus according to claim **10** wherein the at least one sensor is at least two sensors, the at least two sensors comprising a pressure sensor and a volume sensor.

15. An apparatus according to claim **10** wherein the at least one sensor is at least three sensors, the at least three sensors comprising a pressure sensor, a volume sensor, and a temperature sensor.

16. An apparatus according to claim **11** further comprising:

(i) a first controller disposed at a surface location for initial activation of the volume control device;

(ii) a two way communication system for transmitting test initiation commands downhole and for transmitting data up hole; and

(iii) a second controller disposed downhole for determining each of the plurality of rates.

17. An apparatus according to claim **16** wherein the second controller further comprises a processor and an algorithm installed in the processor for computing the formation pressure based on the sensed fluid characteristics.

18. An apparatus according to claim **16** further comprising a processor for matching a pumping rate to mobility.

19. An apparatus according to claim **16** further comprising a processor for detecting a pumping problem based on the parameter of interest.

20. An apparatus according to claim **16**, further comprising: a processor for determining a correlation coefficient and detecting a pumping problem based on the correlation coefficient.

21. A computer readable medium containing instruction that when executed by a computer, perform a method for determining the quality of a formation fluid sample comprising:

(a) conveying a tool into a borehole on a work string, the borehole traversing a subterranean formation containing formation fluid under pressure, the borehole and work string having an annulus between the borehole wall and work string, the annulus being filled with a pressurized fluid containing the formation fluid;

(b) sealing a portion of the annulus by extending at least one selectively extendable device disposed on the tool;

(c) exposing a port to the sealed portion of the annulus, the port being in fluid communication with a test volume created by (a) and (b), the test volume containing a fluid including the formation fluid;

(d) increasing the test volume at a first rate with a volume control device until the test volume pressure falls below formation pressure; and

(e) sensing at least one of (i) permeability, (ii) mobility, (iii) fluid compressibility, (iv) contact points, and (v) pressure.of the fluid using a test device at least twice while the test volume is being increased at the first rate to determine the quality of the formation fluid sample.